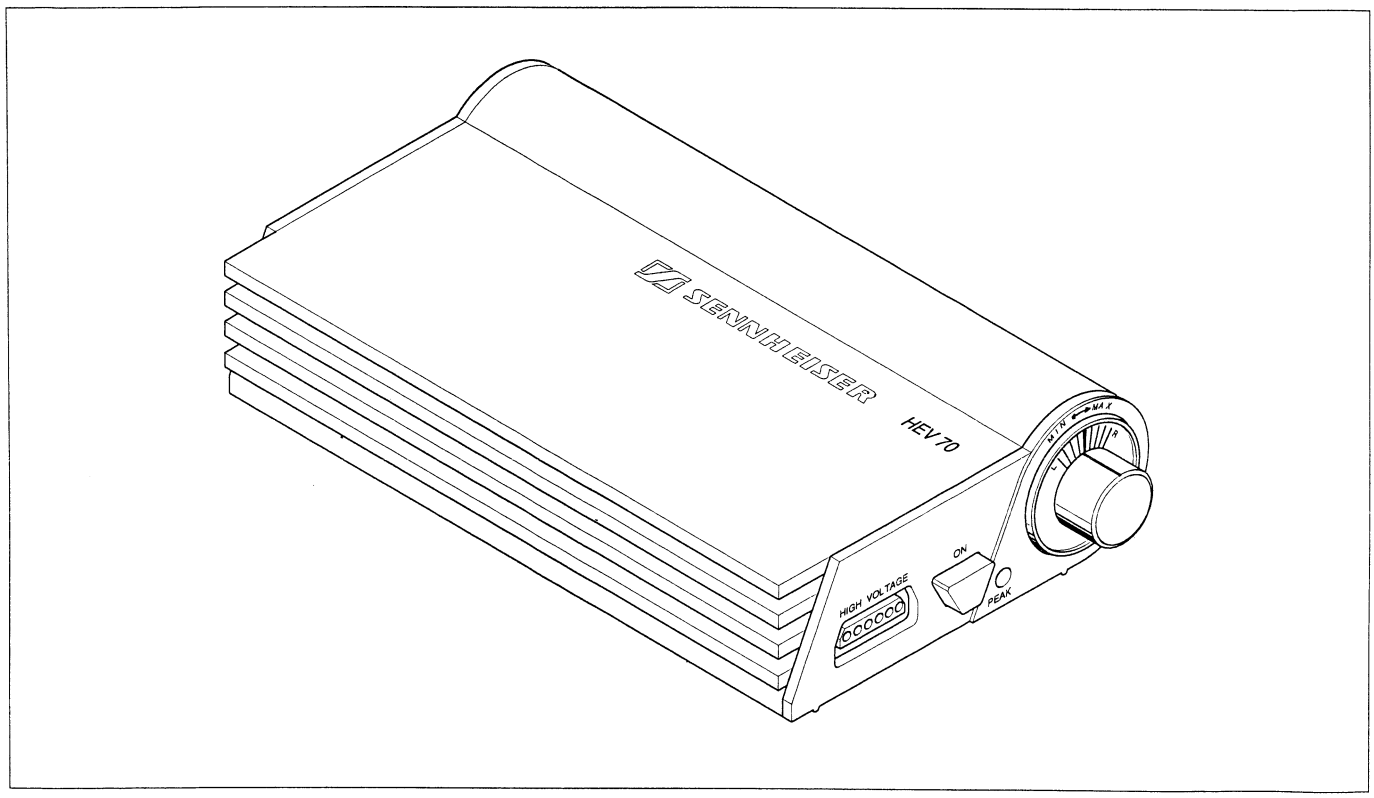
SENNHEISER
Service

HEV 70



KURZBESCHREIBUNG

Der HEV 70 ist ein Verstärker für elektrostatische Kopfhörer (z.B. HE 60). Der Hochvolt- / Halbleiterverstärker liefert die benötigte Polarisationsspannung sowie das verstärkte Tonsignal.

MERKMALE

- Aluminiumgehäuse mit Eloxaloberfläche
- Betriebs- / Peakanzeige
- Ein- / Ausgang für Signalquellen mit Line-Pegeln

BRIEF DESCRIPTION

The HEV 70 amplifier is especially for use with electrostatic headphones like the HE 60. As high voltage / semiconductor amplifier it supplies the polaisation voltage and amplifies the incomming tone signals.

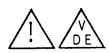
FEATURES

- Aluminium housing
- Power and peak indicator
- Input and output for line level sources

Sennheiser electronic KG D-30900 Wedemark Tel. 0 51 30 / 600 -0
Änderungen vorbehalten / Alterations reserved / Modifications réservées

Sicherheitsvorschriften / Safety requirements/ Prescrizioni de sicurezza / Prescriptions de sécurité / Prescripciones de seguridad

Deutsch

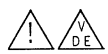


Achtung: Bei Eingriffen in das Gerät sind die Sicherheitsvorschriften nach VDE 701 (reparaturbezogen) bzw. VDE 0860 / IEC 65 (gerätebezogen) zu beachten !

Bauteile nach IEC- bzw. VDE-Richtlinien ! Im Ersatzfall nurTeile mit gleicher Spezifikation verwenden !

MOS - Vorschriften beim Umgang mit MOS - Bauteilen beachten !

English

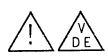


Attention: Please observe the applicable safety requirements according to VDE 701 (concerning repairs) and VDE0860 / IEC 65 (concerning type of product) !

Components to IEC or VDE guidelines ! Only use components with the same specifications for replacement !

Observe MOS components handling instructions when servicing !

Italiano



Attenzione: Osservarne le corrispondenti prescrizioni di sicurezza VDE 701 (concernente servizio) e VDE 0860 / IEC 65 (concernente il tipo di prodono) !

Componenti secondo le norme VDE risp. te IEC ! In caso di sostituzione impiegare solo componenti con le stesse caratteristiche.

Osservare le relative prescrizioni durante, lavori con componenti MOS !

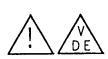
Français

Attention: Priere d'observer les prescriptions de sécurité VDE701 (concernant les reparations) et VDE 0860 / IEC 65 (concernant le type de produit) !

Composants répondant aux normes VDE ou IEC. Les remplacer uniquement par des composants ayant les memes spécifications.

Lors de la manipulation des circuits MOS, respecter les pescriptions MOS !

Español



Atención: Recomendamos las normas de seguridad VDE u otras normas equivalentes, por ejemplo: VDE 701 para reparaciones, VDE 0860 / IEC 65 para aparatos !

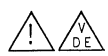
Componentes que cumplen las normas VDE / IEC. En caso de sustitución, emplear componentes con idénticas especificaciones !

Durante la reparacion observar las normas sobre componentes MOS !

USA & Canada

Attention: This set can only be operated from AC mains of 120V / 60Hz. Also observe the information given on the rear of the set !

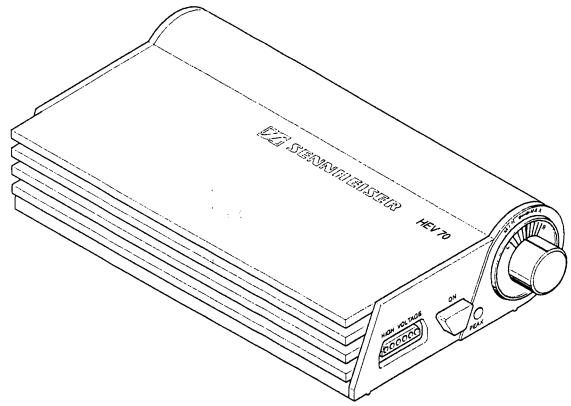
CAUTION: For continued protection against risk of fire replace only with same type fuses!
CAUTION: To reduce the risk of electric shock, do not remove cover (or back), no user-serviceable parts inside,refer servicing to qualified service personnel.



Components to safety guidelines (IEC / U.L.) ! Only use components with the same specifications for replacement !

Observe by checking leakage-current or resistance measurement that the exposed parts are acceptably insulated from the supply circuit.

Observe MOS components handling instructions when servicing !



BRUMMSTÖRUNGEN VERSTÄRKER HEV 70

In einigen Ausnahmefällen können nach längerer Betriebsdauer (3-8 Stunden) bei dem Verstärker HEV 70 störende Brummtöne bzw. "Zirpgeräusche" auftreten. Ausgelöst wird diese Störung durch Rückwirkung des Schaltnetzteils.

Abhilfe schafft das Einfügen eines Spannungsstabilisators mit entsprechender Beschaltung. Die Bauteile werden, wie in Text und umseitiger Zeichnung beschrieben, montiert.

Der Sennheiser Kundendienst bietet unter der Ersatzteilnummer 70035 das "Modifikations-Set HEV 70" an. Dieser Bauteilesatz beinhaltet alle zu einer Modifikation benötigten Bauelemente.

- Spannungsstabilisator-IC (U6) mit Kühlkörper (16) am Abschirmblech verschrauben.
- Eingang U6 in Lötpunkt verlöten.
- Mittleren Pin des U6 (GND) an Abschirmblech löten.
- Pluspol des Kondensators C78 und Eingang der Spule L2 auf den Ausgang von U6 löten.
- Minuspol des Kondensators C78 an Abschirmblech löten.
- Widerstand R129 von L2 nach Masse löten.
- Freilaufdiode D36 über Spule L2 und Spannungsstabilisator U6 löten.

Nach der Modifikation ist ein Neuabgleich des Verstärkers notwendig. Dazu müssen alle Bauteile auf Umgebungstemperatur abgekühlt sein.

- Stromaufnahme mit R128 auf Minimum (ca. 230 mA) einstellen.
- R128 entgegen dem Uhrzeigersinn drehen und die Stromaufnahme auf 265 - 270 mA einstellen.

Nach dem Abgleich muß die Stromaufnahme des Verstärkers langsam sinken.

HEV 70 AMPLIFIER BUZZING SOUNDS

In very rare cases, buzzing or chirping sounds may be heard when the HEV 70 amplifier has been used for a longer period of time (3-8 hours). These sounds are due to the power supply unit.

You can eliminate these noises by mounting a voltage regulator plus accompanying components. Mount the components as described in the following text and as shown in the diagrams on the next page.

The Sennheiser Service offers the "HEV 70 Modification Set", part no. 70035. This set contains all components which are necessary for eliminating the buzzing noises.

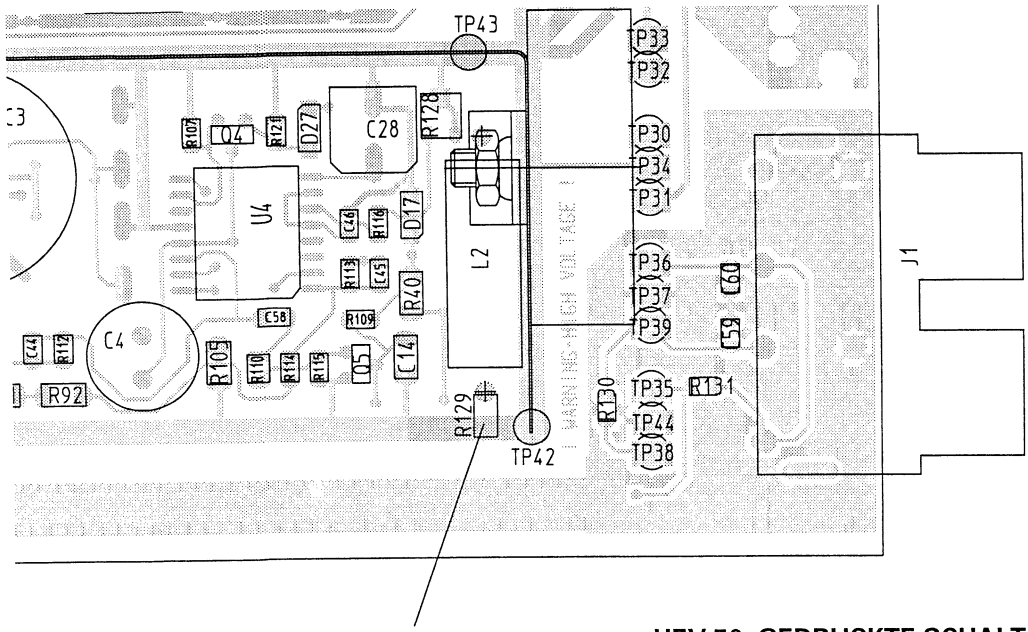
- Screw the voltage regulator IC (U6) and the heat sink (16) to the electric shielding plate as shown in the diagrams.
- Solder input U6 to its solder joint.
- Solder the middle pin of U6 (GND) to the shielding plate.
- Solder the positive terminal of capacitor C78 and the input of coil L2 to the output of U6.
- Solder the negative terminal of capacitor C78 to the shielding plate.
- Solder resistor R129 from L2 to ground.
- Solder diode D36 to coil L2 and voltage regulator U6.

After having mounted these components, the amplifier has to be re-aligned. It is important that all components have ambient temperature.

- Adjust current consumption with R128 to minimum (approx. 230 mA).
- Turn R128 ccw to adjust the current consumption to 265 - 270 mA.

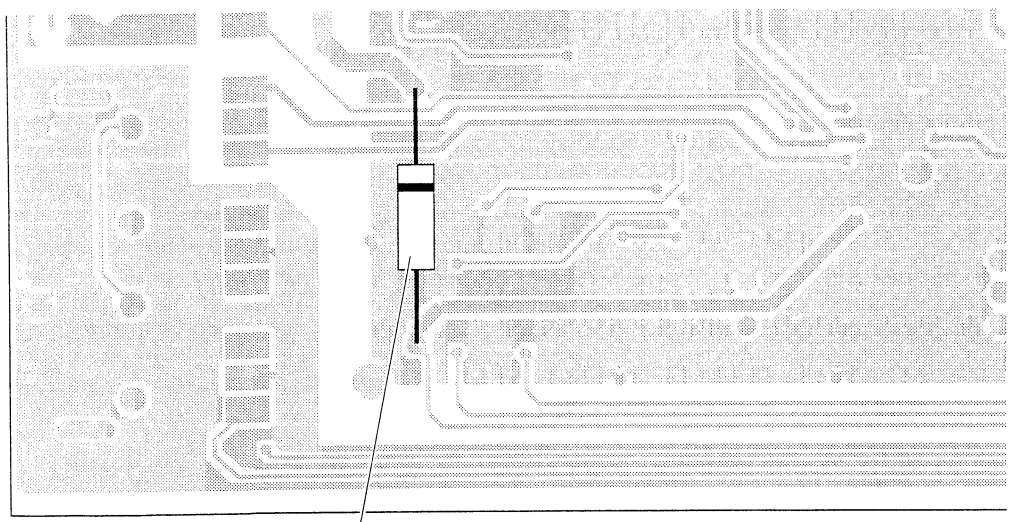
After re-alignment the current consumption decreases slowly.

POS	IDENT	BEZEICHNUNG	DESCRIPTION
012	25295	Zahnscheibe (MOQ:10)	Tooth lock washer (MOQ:10)
013	22669	Scheibe 3,3 DIN433 (MOQ:10)	Washer 3.2 DIN433 (MOQ:10)
014	22859	Zahnscheibe A3,2 DIN6797 (MOQ:10)	Tooth lock washer A3.2 (MOQ:10)
015	22998	Linsenschraube M3x8 DIN7985 (MOQ:10)	Lens screw M3x8 DIN7985 (MOQ:10)
016	55693	Kühlkörper	Heat sink
017	22684	Sechskantmutter BM3 DIN439 (MOQ:10)	Hexagon nut BM3 DIN439 (MOQ:10)
C078	24509	Kondensator AL ELKO 1µF 50V	Capacitor AL ELKO 1µF 50V
D036	17465	Diode 1N4007	Diode 1N4007
R129	34512	SMD Widerstand 4k75 1% 0204 (MOQ:50)	SMD resistor 4k75 1% 0204 (MOQ:50)
U006	28245	IC 7824 TO220-0/70	IC 7824 TO220-0/70



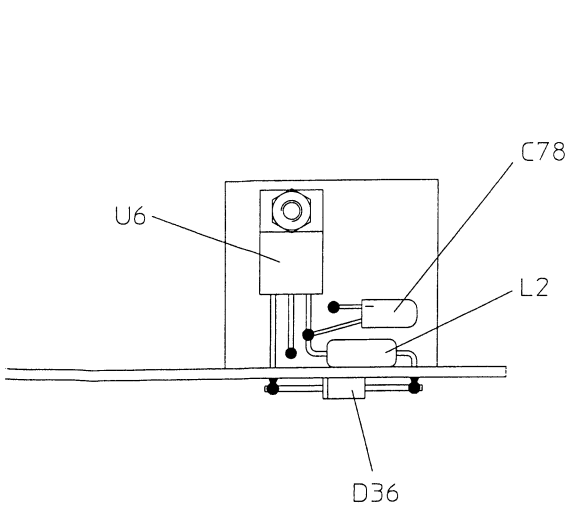
R129

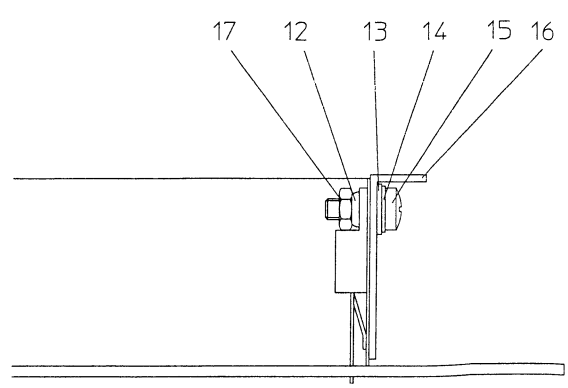
HEV 70, GEDRUCKTE SCHALTUNG, BESTÜCKUNGSSEITE
HEV 70, PRINTED CIRCUIT BOARD, COMPONENT SIDE



D36

HEV 70, GEDRUCKTE SCHALTUNG, LÖTSEITE
HEV 70, PRINTED CIRCUIT BOARD, SOLDER SIDE





HEV 70, GEDRUCKTE SCHALTUNG MIT MODIFIKATION
HEV 70, PRINTED CIRCUIT BOARD WITH MODIFICATION

INHALTSVERZEICHNIS

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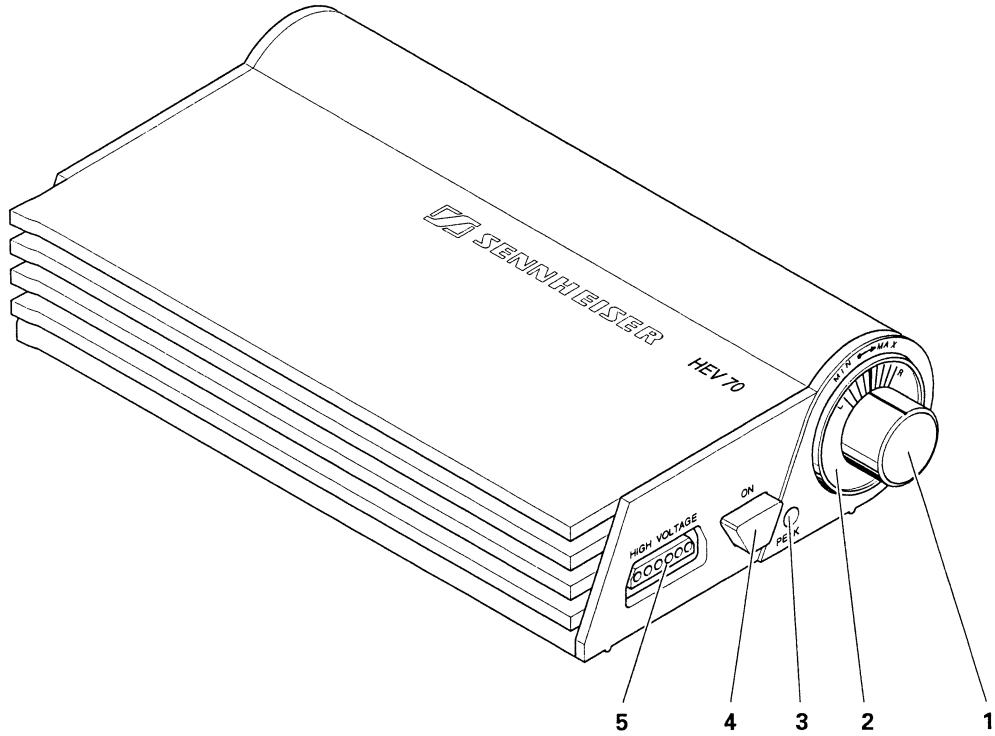
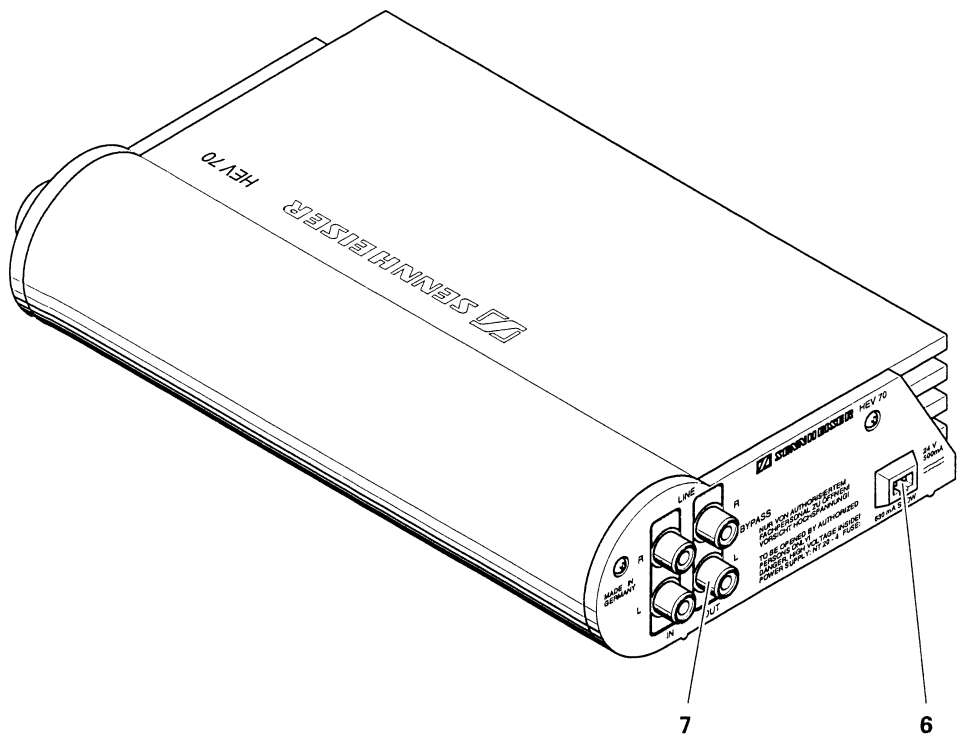
1. BEDIENELEMENTE

1. OPERATING ELEMENTS



1 Lautstärkeregler rechts
2 Lautstärkeregler links
3 Betriebs- und Übersteuerungsanzeige
4 EIN / AUS-Schalter
5 Anschlußbuchse für elektrostatischen Kopfhörer

1 Volume control right
2 Volume control left
3 Operating and peak level indicator
4 ON / OFF switch
5 Socket for electrostatic headphone



6 Stromversorgungsanschluß
7 LINE Ein- und Ausgänge

6 Socket for power supply
7 Sockets for LINE input and output

2. TECHNISCHE DATEN

Polarisationsspannung	540 V
Übertragungsbereich	10 - 20.000 Hz (± 1 dB)
S/N Fremdspannungsabstand	≥ 93 dB
Klirrfaktor	≤ 0,01 %
Eingangsempfindlichkeit	250 mV
Eingangsimpedanz	10 kΩ
Ausgangsspannung	max. 400 Veff
Steckernetzteil	NT 20 (120 V, 230 V, 240 V länderspezifisch)
Netzfrequenz	50 - 60 Hz
Leistungsaufnahme	ca. 11 VA
Abmessungen in mm	ca. 118 x 25 x 90
Gewicht	750 g

2. TECHNICAL DATA

Polarisation voltage	540 V
Amplitude response	10 - 20,000 Hz (± 1 dB)
S/N ratio	≥ 93 dB
Distorsion (1 KHz)	≤ 0,01 %
Line input sensitivity	250 mV
Line input impedance	10 kΩ
Output voltage	400 Veff max.
Power supply unit	NT 20 type (120 V, 230 V, 240 V according to the country)
Line power frequency	50 - 60 Hz
Power consumption	approx. 11 VA
Dimensions in mm	approx. 118 x 25 x 90
Weight	750 g

3. SERVICE HINWEISE

3.1. SMD (SURFACE MOUNTED DEVICES)

Die Leiterplatte des HEV 70 ist weitgehend mit Chip-Elementen (SMD) bestückt. Sollte beim Hantieren mit den Baugruppen ein SMD mechanisch zerstört werden, ist es erforderlich, dieses Bauelement zu ersetzen.

SMD werden direkt auf die dafür vorgesehenen Lötflächen gelötet. Hierfür besitzen sie lötfähige Stirnkontaktierungen, die weitgehend hitzeunempfindlich sind.

Zum Auswechseln ist folgendes Werkzeug erforderlich: Neben einer Pinzette und einem normalen temperaturgeregelten Lötkolben (z. B. Weller mit 0,8 mm Flachkopflötspitze PT-H 7 oder 0,8 mm Langkopflötspitze PT-K 7) sollten noch ein absolut rückschlagfreies Absauggerät und 1,2 mm Entlötlitze vorhanden sein. Sinnvoll ist eine Arbeitslupe.

Die Lötzeit ist so kurz wie möglich zu halten, damit die Leiterbahnen nicht beschädigt werden. Beim Auslöten der Bauteile ist darauf zu achten, daß die Leiterbahnen nicht abgehoben werden. Danach ist die Auflagefläche der Bauteile von Lötresten zu säubern. Um mechanische Spannungen in den Bauteilen zu vermeiden, sollte man erst nach dem Erkalten der ersten Lötstelle die gegenüberliegende Seite anlöten.

Eine Wiederverwendung eines bereits ausgelöteten Chip-Bauelementes ist nicht zulässig. Dies gilt auch dann, wenn es offensichtlich fehlerfrei ist, da durch die mechanische Beanspruchung beim Ein- und Auslöten eine Beschädigung nicht ausgeschlossen werden kann.

Die SMD werden in Packeinheiten von je 50 Stück geliefert. Die Verpackungen müssen verwechslungssicher gekennzeichnet sein, da nur so eine Unterscheidung der Bauteile möglich ist.

3. SERVICE HINTS

3.1. SMD (SURFACE MOUNTED DEVICES)

The PCB of the HEV 70 is chiefly equipped with Surface Mounted Devices (SMD). Handle with care. Should one SMD be damaged replace defective component with new one.

SMDs must be soldered to the surface provided for this purpose. They feature solderable contacts which are insensitive to heat.

Tools required to replace SMDs: tweezers, temperature-controlled soldering iron (e.g. Weller with 0.8 mm flat headed soldering tip PT-H 7 or 0.8 mm oblong soldering tip PT-K 7), blow-back proof unsoldering set, 1.2 mm unsoldering braid. It is recommendable to use magnifying glasses.

Minimize soldering time in order not to damage the p.c.b. Be careful not to damage any tracks when unsoldering components. Clean the surface. Wait until the first soldered joint has cooled down before starting to solder the opposite side. This serves to avoid stress built-up in the components.

Do not reuse unsoldered components, even if they seem to be faultless. Mechanical damage, possibly caused by soldering or unsoldering components, cannot be excluded.

SMDs are available as spare parts, 50 pcs. packaged in a poly bag. Packages should be marked to make the components distinguishable from each other.

SICHERHEITSHINWEISE

WURDE DER VERSTÄRKER HEV 70 LÄNGERE ZEIT BEI KALTEN TEMPERATUREN GELAGERT, CA. 1-2 STUNDEN WARTEN DAMIT SICH DAS GERÄT AUF NORMALE ZIMMERTEMPERATUR ERWÄRMT. ES BESTEHT SONST DIE GEFAHR, DASS DER VERSTÄRKER IM BETRIEB DURCH KONDENSATION SCHADEN NIMMT!

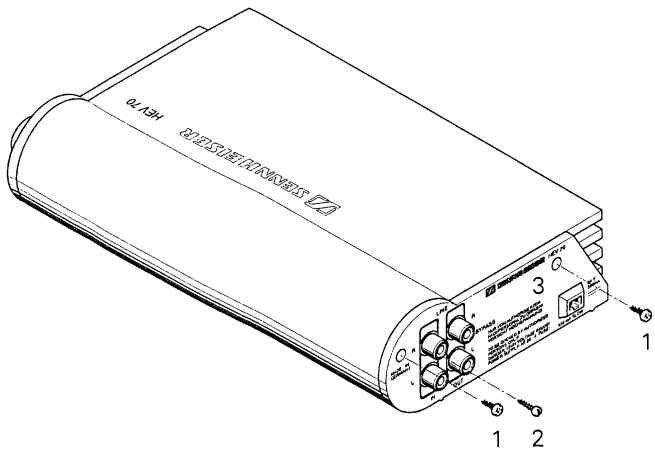
WÄHREND DER DEMONTAGE DES VERSTÄRKERS HEV 70 DARF DAS GERÄT AUF KEINEN FALL UNTER SPANNUNG STEHEN!

AUFGRUND DER DORT AUFTRETENDEN HOCH-SPANNUNG BESTEHT LEBENSGEFAHR!

WÄHREND DER REPARATUR SIND BESTEHENDE SICHERHEITSVORSCHRIFTEN ZU BEACHTEN!

3.2. DEMONTAGE

- Anschlüsse (NF-Eingang, Steckernetzteil) abziehen.
- Kreuzschlitzschrauben (1) und Torxschraube (2) entfernen.
- Rückwand (3) entfernen.
- Madenschrauben (4) auf der Geräteunterseite lösen.
- Leiterplatte mit Bedienungselementen nach vorne aus Gehäuse (5) schieben.



3.3. VORBEREITUNGEN

- Verstärker HEV 70 demontieren (siehe 3.2.).
- Verstärker HEV 70 auf einer elektrisch nicht leitfähigen Unterlage positionieren.
- Lautstärkeeinsteller R104.1 und R104.2 auf minimale Lautstärke einstellen (Linksanschlag).
- Elektrostatischen Kopfhörer (z.B. HE 60) am Ausgang des Verstärkers HEV 70 anschließen (definierter Abschluß).
- NF-Signalgenerator an NF-Eingangsbuchsen R und L (J1) anschließen (200 mV / 1 kHz).
- Steckernetzteil NT 20 oder Netzgerät (24 VDC / 1A) an Kontaktstiften anschließen (TP1: +24 V / TP2: 0 V).
  Bei Speisung mit *NT 20* ist die Stromaufnahme durch Entlöten von Sicherung F1 und entsprechendes Einschleifen eines DC-Amperemeters zu überprüfen.
  Bei Speisung mit *Netzgerät* kann ein DC-Amperemeter in die Spannungsversorgung eingeschaltet werden.
- Verstärker HEV 70 mit Schalter S1 auf "ON" schalten. Zur Kontrolle leuchtet die Betriebsanzeige grün.
- Verfahren wie in der Abgleichanweisung beschrieben.

SAFETY INSTRUCTIONS

IF THE HEV 70 AMPLIFIER HAS BEEN STORED OVER A LONG PERIOD AT COLD TEMPERATURES, WAIT APPROX. 1-2 HOURS UNTIL IT HAS WARMED UP TO NORMAL ROOM TEMPERATURE. OTHERWISE, THE AMPLIFIER MAY BE DAMAGED DURING OPERATION DUE TO CONDENSATION!

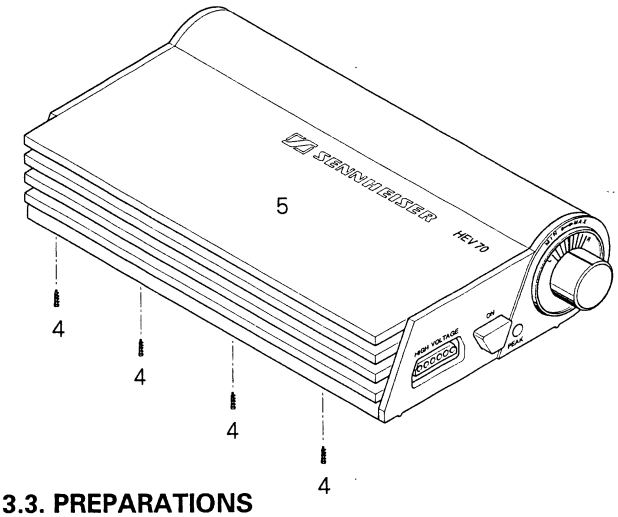
THE HEV 70 AMPLIFIER MUST NEVER BE LIVE DURING DISASSEMBLY!

DANGER - THE UNIT CONTAINS HIGH VOLTAGE!

DURING REPAIR WORK, EXISTING SAFETY REGULATIONS MUST BE OBSERVED!

3.2. DISASSEMBLY

- Pull out connections (AF input, plug-in power supply).
- Remove Phillips screws (1) and torx screw (2).
- Take off rear panel (3).
- Slacken grub screws (4) on the underside of the unit.
- Push the printed circuit board with control elements forwards out of the housing (5).



3.3. PREPARATIONS

- Disassemble HEV 70 amplifier (see 3.2.).
- Place the HEV 70 amplifier on a non-conductive surface.
- Set the volume controls R104.1 and R104.2 to minimum volume (left as far as possible).
- Connect electrostatic headphone (e.g. HE 60) to the output of the HEV 70 amplifier (defined termination).
- Connect AF signal generator to AF input jacks R and L (J1) (200 mV / 1 kHz).
- Connect plug-in power supply NT 20 or mains power supply unit (24 VDC / 1A) to the contact pins (TP1: +24 V / TP2: 0 V).
  When power is supplied by *NT 20*, the current consumption must be checked by desoldering fuse F1 and looping in a DC current meter.
  When the supply is from the *mains power supply unit*, a DC current meter can be switched into the voltage supply.
- Switch the HEV 70 amplifier to "ON" with switch S1. The operational display lights up green to confirm this.
- Proceed as described in the test and alignment instructions.

4. MESSGERÄTE UND PRÜFMITTEL

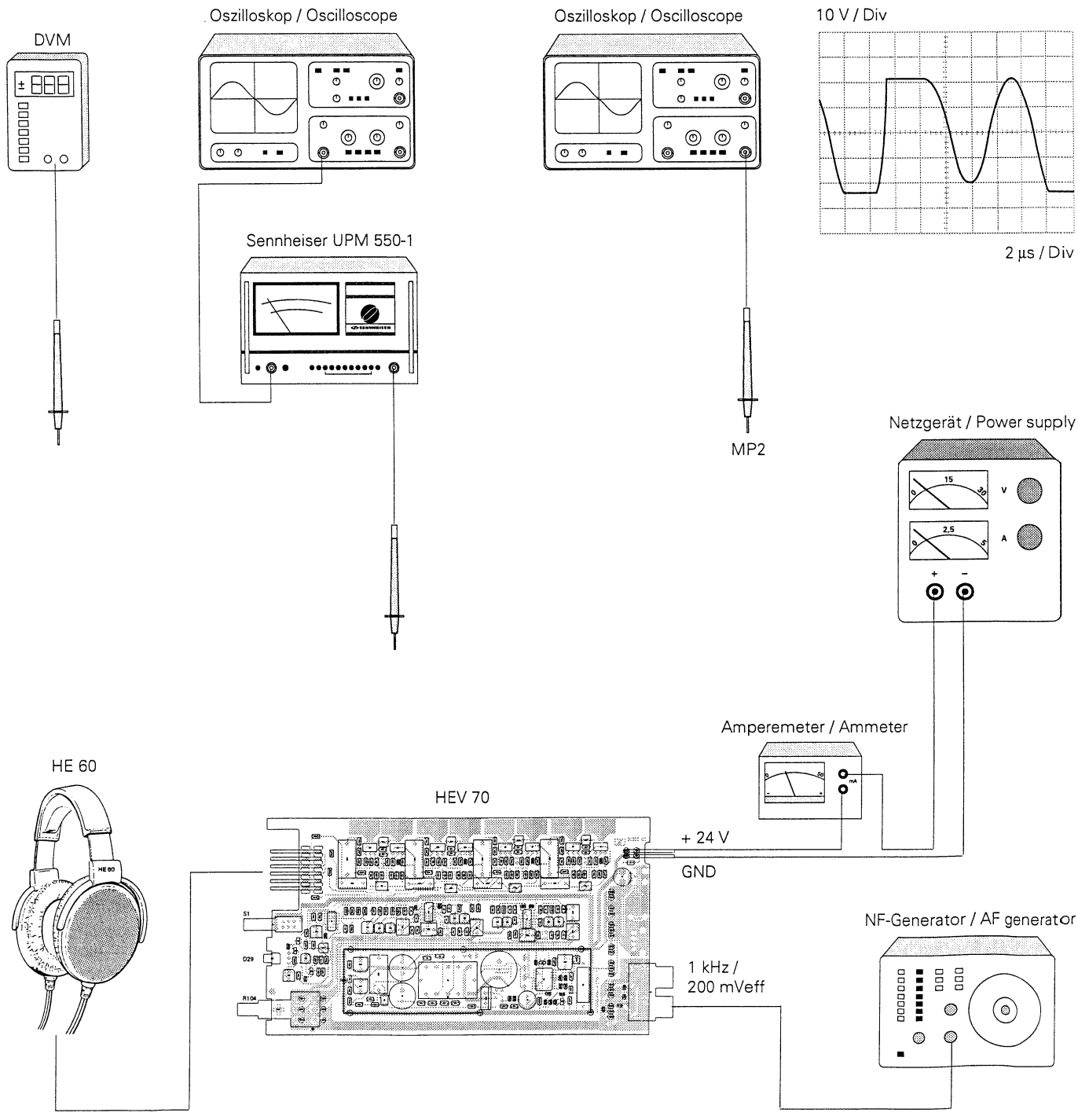
1 Netzgerät 0 - 30 V / 1A oder Steckernetzteil NT 20
1 DC - Voltmeter (z.B. Thandar TM 351)
1 DC - Amperemeter (z.B. Thandar TM 351)
1 NF - Signalgenerator 20 Hz - 20 kHz, einstellbar, k ≤ 0,1 %
1 NF - Voltmeter (z.B. UPM 550-1, Sennheiser)
1 Klirrfaktormeßgerät (z.B. UPM 550-1, Sennheiser)
1 Oszilloskop (z.B. Hameg 203)
1 Elektrostatischer Kopfhörer (z.B. Sennheiser HE 60)

4. SPECIAL TOOLS AND EQUIPMENT

1 Power supply unit 0 - 30 V / 1A or plug-in transformer NT 20
1 DC voltmeter (e.g. Thandar TM 351)
1 DC ammeter (e.g. Thandar TM 351)
1 AF generator 20 Hz - 20 kHz, adjustable, THD ≤ 0.1 %
1 AF voltmeter (e.g. UPM 550-1, Sennheiser)
1 THD meter (e.g. UPM 550-1, Sennheiser)
1 Oscilloscope (e.g. Hameg 203)
1 Electrostatic headphone (e.g. Sennheiser HE 60)

5. MESSAUFBAU

5. TEST SET-UP



6. PRÜF - UND ABGLEICHANWEISUNG

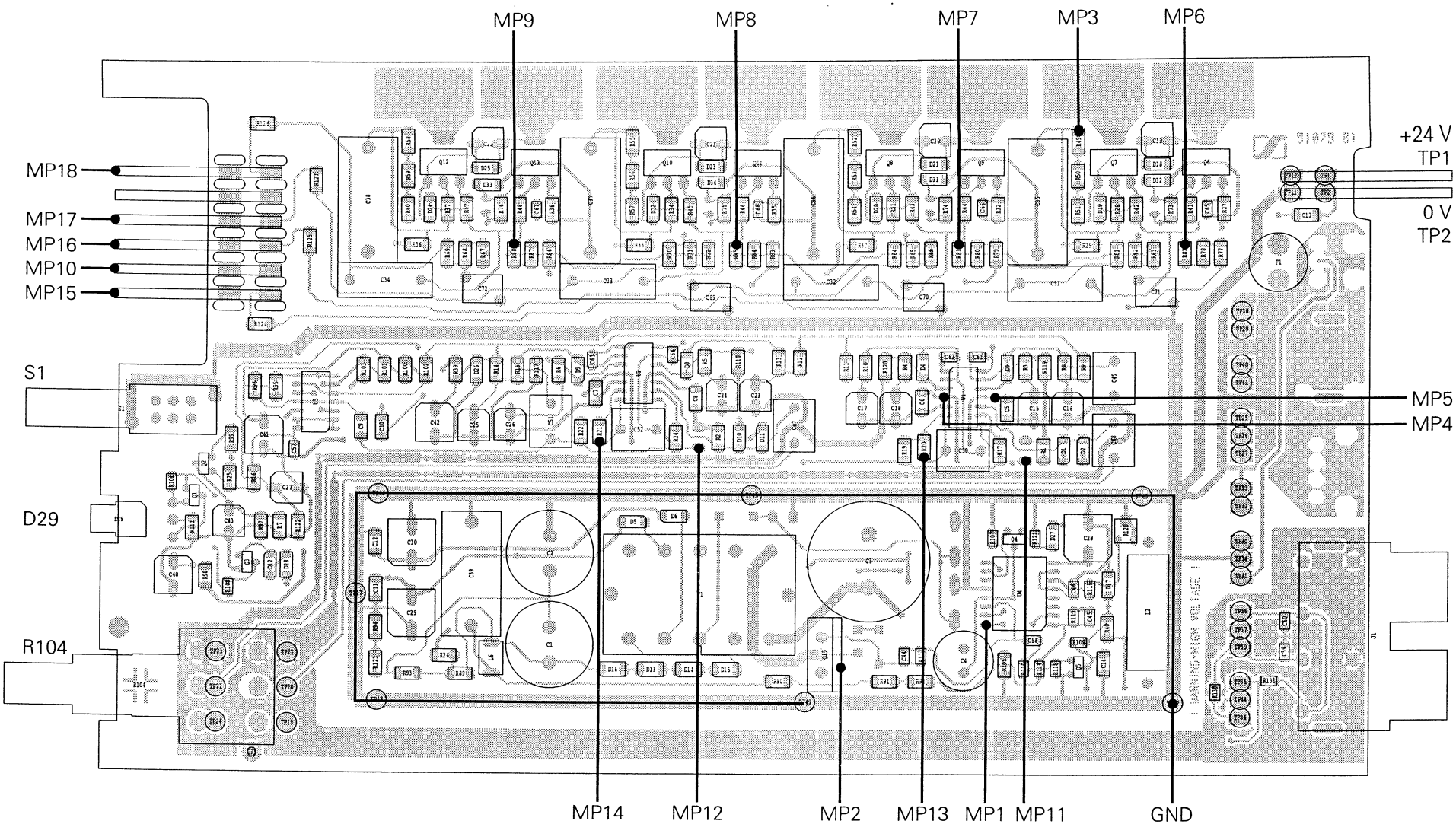
Nr.	Messung, Einstellung	Signal-einspeisung	Vorbereitung, Geräteeinstellung	Meßpunkt	Sollwert	Einsteller	Bemerkungen
1	Stromaufnahme	NF - Generator an J1 R und L-Kanal: 200 mVeff / 1 kHz	Schalter S1 "ON" Lautstärkeeinsteller R104.1 und R104.2 "Rechtsanschlag"; DC-Amperemeter	Eingangs-strom	210 - 230 mA (minimum)	R128	LED D29 leuchtet rot
1.1	Betriebsspannung	wie 1.	wie 1.; DC - Voltmeter	TP1	24 - 28 VDC		
2	Referenzspannung	wie 1.	wie 1.; DC - Voltmeter	MP1	5,1 VDC		
3	Schaltfrequenz	wie 1.	wie 2.; Oszilloskop	MP2	> 60 kHz		siehe Oszillo-gramm auf Seite 7
4	Betriebsspannung + 600 V	wie 1.	wie 2.; DC - Voltmeter	MP3	580 - 600 VDC		
4.1	Betriebsspannung + 10 V	wie 1.	wie 2.; DC - Voltmeter	MP4	10 VDC		
4.2	Betriebsspannung – 10 V	wie 1.	wie 2.; DC - Voltmeter	MP5	– 10 VDC		
4.3	Arbeitspunkt Endstufe	wie 1.	wie 2.; DC - Voltmeter	MP6 (+R) MP7 (–R) MP8 (–L) MP9 (+L)	300 ± 15 VDC		
5	Polarisations-spannung	wie 1.	wie 2.; DC - Voltmeter	MP10	255 VDC		
6	NF - Verstärker	wie 1.	wie 2.; UPM 550 - 1 und Oszilloskop	MP11 (R) MP12 (L)	190 - 200 mVeff		
6.1	NF - Verstärker	wie 1.	wie 2.; UPM 550 - 1 und Oszilloskop	MP13 (R) MP14 (L)	190 - 200 mVeff		
6.2	Ausgangsspannung	falls Ausgänge in Begrenzung, NF - Generatorausgang auf bis zu 180 mVeff verringern	wie 2.; UPM 550 - 1 und Oszilloskop	MP15 (+R) MP16 (–R) MP17 (–L) MP18 (+L)	180 - 200 Veff		Ausgangssig-nale sind nicht in Begrenzung (Klipping)
7	Klirrfaktor	wie 6.2.	wie 2.; UPM 550 - 1 und Oszilloskop	MP15 (+R) MP16 (–R) MP17 (–L) MP18 (+L)	k < 0,3 %		
8	Frequenzgang	NF - Generator: 60 mVeff / 1 kHz	wie 2.; Angezeigten Wert auf UPM 550 - 1 als 0 dB-Wert einstellen (Uncal. - Regler)	MP15 (+R) MP16 (–R) MP17 (–L) MP18 (+L)	U = 0 dB		LED D29 leuchtet grün
8.1	Frequenzgang	Mit NF - Generator Frequenzbereich von 20 Hz bis 20 kHz durchstimmen		MP15 (+R) MP16 (–R) MP17 (–L) MP18 (+L)	– 2 ... 0 dB		

NOTIZEN:

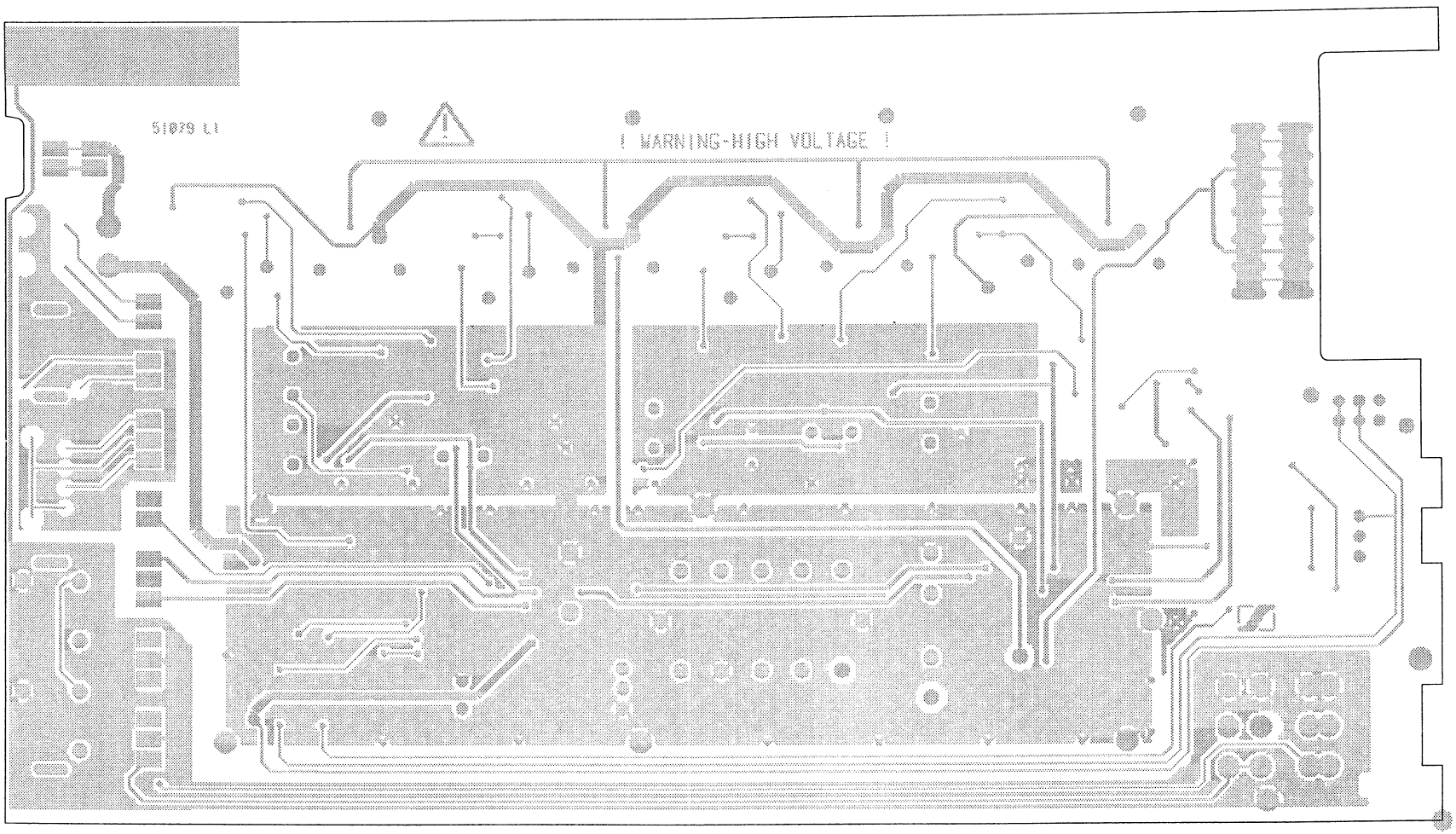
6. TEST AND ALIGNMENT INSTRUCTIONS

No.	Measurement, adjustment	Signal input	Preparations, settings	Test point	Desired value	Adjuster	Remarks
1	Current consumption	AF signal generator to J1 (R and L channel): 200 mVeff / 1 kHz	Switch S1 "ON" volume control R104.1 and R104.2 "cw"; DC ammeter	Input current	210 - 230 mA (minimum)	R128	LED D29 "red"
1.1	Operating voltage	as 1.	as 1.; DC voltmeter	TP1	24 - 28 VDC		
2	Reference voltage	as 1.	as 1.; DC voltmeter	MP1	5.1 VDC		
3	Converter frequency	as 1.	as 2.; Oscilloscope	MP2	> 60 kHz		please see pattern on page 7
4	Operating voltage + 600 V	as 1.	as 2.; DC voltmeter	MP3	580 - 600 VDC		
4.1	Operating voltage + 10 V	as 1.	as 2.; DC voltmeter	MP4	10 VDC		
4.2	Operating voltage - 10 V	as 1.	as 2.; DC voltmeter	MP5	- 10 VDC		
4.3	Output stage bias voltage	as 1.	as 2.; DC voltmeter	MP6 (+R) MP7 (-R) MP8 (-L) MP9 (+L)	300 ± 15 VDC		
5	Polarisation voltage	as 1.	as 2.; DC voltmeter	MP10	255 VDC		
6	AF amplifier	as 1.	as 2.; UPM 550 - 1 and Oscilloscope	MP11 (R) MP12 (L)	190 - 200 mVeff		
6.1	AF amplifier	as 1.	as 2.; UPM 550 - 1 and Oscilloscope	MP13 (R) MP14 (L)	190 - 200 mVeff		
6.2	Output voltage	if outputs are clipping decrease AF signal generator voltage down to 180 mVeff	as 2.; UPM 550 - 1 and Oscilloscope	MP15 (+R) MP16 (-R) MP17 (-L) MP18 (+L)	180 - 200 Veff		Output voltage is not clipping
7	THD	as 6.2.	as 2.; UPM 550 - 1 and Oscilloscope	MP15 (+R) MP16 (-R) MP17 (-L) MP18 (+L)	k < 0.3 %		
8	Frequency response	AF signal generator: 60 mVeff / 1 kHz	as 2.; set indicated value to reference level, adjust UPM 550 - 1 to 0 dB (Uncal. - Adjuster)	MP15 (+R) MP16 (-R) MP17 (-L) MP18 (+L)	U = 0 dB		LED D29 "green"
8.1	Frequency response	Check frequency response with AF signal generator from 20 Hz to 20 kHz		MP15 (+R) MP16 (-R) MP17 (-L) MP18 (+L)	- 2 ... 0 dB		

NOTES:



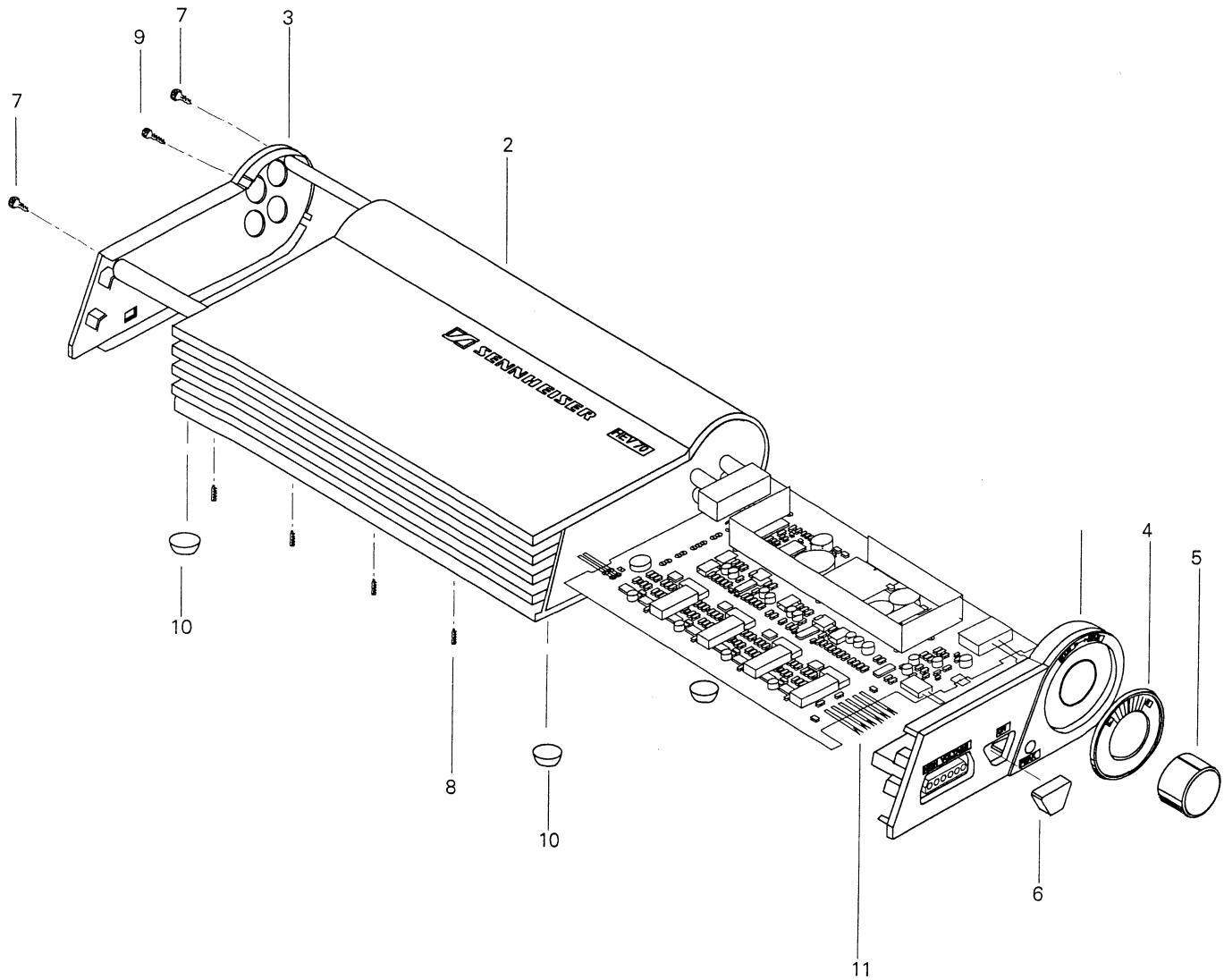
HEV 70, MESSPUNKTE
HEV 70, TEST POINTS



HEV 70, GEDRUCKTE SCHALTUNG, LÖTSEITE
HEV 70, PRINTED CIRCUIT BOARD, SOLDER SIDE

10. EXPLOSIONSZEICHNUNG

10. EXPLODED VIEW



11. ERSATZTEILE

11. SPARE PARTS

POS	IDENT	BEZEICHNUNG	DESCRIPTION
001	51011	Gehäuseschale, vorne	Housing shell, front
002	51030	Gehäuseprofil	Housing profil
003	51013	Gehäuseschale, hinten	Housing shell, rear
004	51044	Drehknopf "L...R"	Knob "L...R"
005	51046	Drehknopf	Knob
006	51048	Knopf	Knob
007	41361	Linsenschraube M2,5x8 DIN7985 (MOQ:10x)	Lens screw M2.5x8 DIN7985 (MOQ:10x)
008	52111	Gewindestift	Threaded pin
009	52145	Zylinderschraube KB30x10 (MOQ:10x)	Cheese head screw KB30x10 (MOQ:10x)
010	51087	Klebefuß	Foot
011	51050	Gabelfeder	Spring, forked
AA001	28727	Bezeichnungsschild	Type plate
AA002	51061	Kabel 1m 2xChinch/2xChinch	Cable 1m 2xChinch/2xChinch
AA003	53295	Stecker-Netzteil 120V/24VDCx0,5A-US	AC/DC converter 120V/24VDCx0.5A-US
C001	45518	Kondensator AL-ELKO 10uF 400V CA	Capacitor AL-ELKO 10uF 400V CA
C002	45518	Kondensator AL-ELKO 10uF 400V CA	Capacitor AL-ELKO 10uF 400V CA
C003	41390	Kondensator AL-ELKO 680uF 50V CA	Capacitor AL-ELKO 680uF 50V CA
C004	24566	Kondensator AL-ELKO 100uF 16V	Capacitor AL-ELKO 100uF 16V
C005	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C006	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C007	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C008	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)

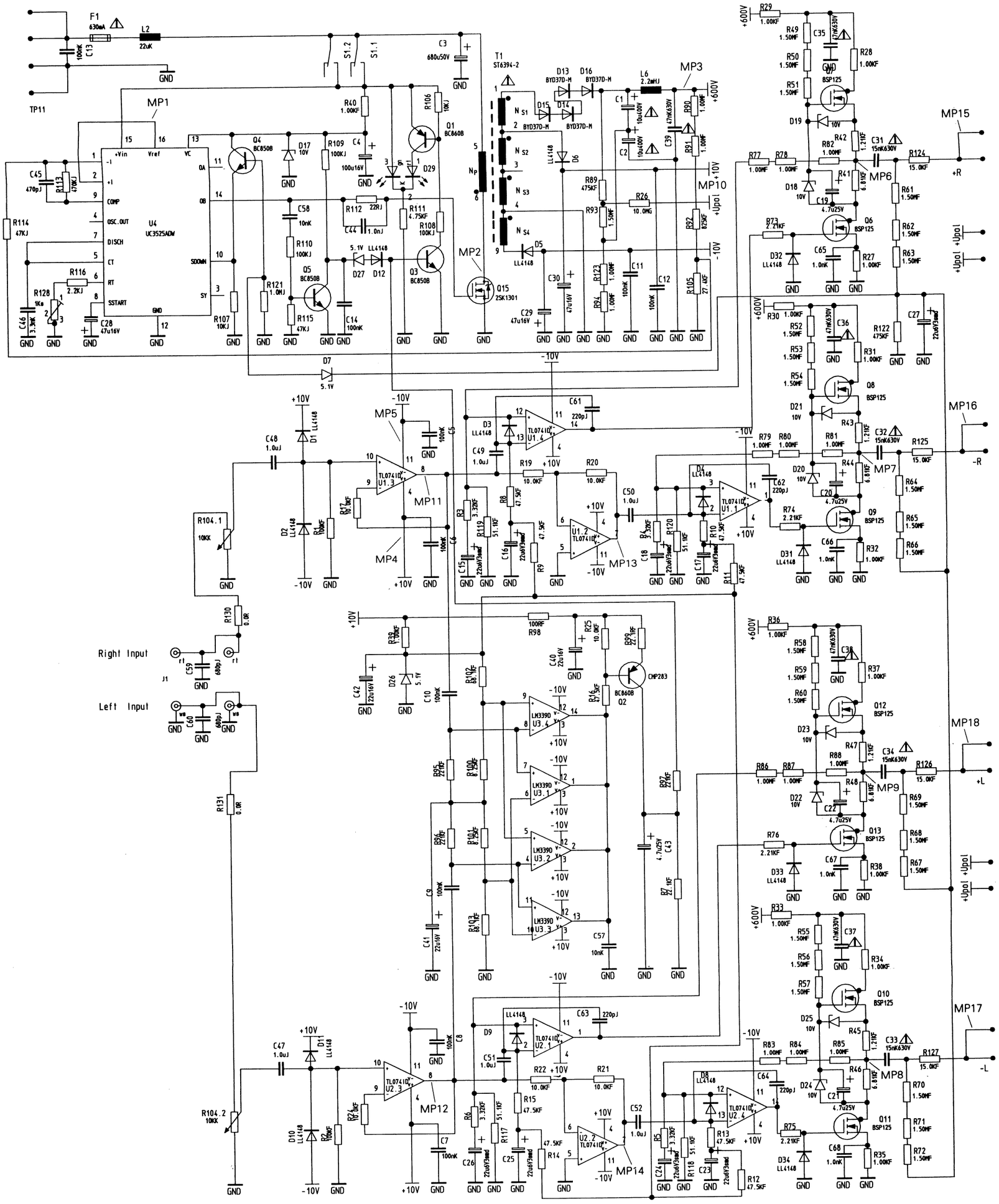
POS	IDENT	BEZEICHNUNG	DESCRIPTION
C009	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C010	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C011	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C012	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C013	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C014	19480	SMD Kondensator KERKO 100nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 100nF 50V X7R (MOQ:50x)
C015	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C016	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C017	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C018	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C019	45342	SMD Kondensator AL-ELKO 4,7uF 25V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 4.7uF 25V SUP12 (MOQ:50x)
C020	45342	SMD Kondensator AL-ELKO 4,7uF 25V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 4.7uF 25V SUP12 (MOQ:50x)
C021	45342	SMD Kondensator AL-ELKO 4,7uF 25V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 4.7uF 25V SUP12 (MOQ:50x)
C022	45342	SMD Kondensator AL-ELKO 4,7uF 25V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 4.7uF 25V SUP12 (MOQ:50x)
C023	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C024	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C025	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C026	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C027	39658	SMD Kondensator AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 6,3V SUP12 (MOQ:50x)
C028	39656	SMD Kondensator AL-ELKO 47uF 16V SUP16 (MOQ:50x)	SMD capacitor AL-ELKO 47uF 16V SUP16 (MOQ:50x)
C029	39656	SMD Kondensator AL-ELKO 47uF 16V SUP16 (MOQ:50x)	SMD capacitor AL-ELKO 47uF 16V SUP16 (MOQ:50x)
C030	39656	SMD Kondensator AL-ELKO 47uF 16V SUP16 (MOQ:50x)	SMD capacitor AL-ELKO 47uF 16V SUP16 (MOQ:50x)
C031	45509	Kondensator MKC-KO 15nF 630/220V	Capacitor MKC-KO 15nF 630/220V
C032	45509	Kondensator MKC-KO 15nF 630/220V	Capacitor MKC-KO 15nF 630/220V
C033	45509	Kondensator MKC-KO 15nF 630/220V	Capacitor MKC-KO 15nF 630/220V
C034	45509	Kondensator MKC-KO 15nF 630/220V	Capacitor MKC-KO 15nF 630/220V
C035	45510	Kondensator MKC-KO 47nF 630/220V	Capacitor MKC-KO 47nF 630/220V
C036	45510	Kondensator MKC-KO 47nF 630/220V	Capacitor MKC-KO 47nF 630/220V
C037	45510	Kondensator MKC-KO 47nF 630/220V	Capacitor MKC-KO 47nF 630/220V
C038	45510	Kondensator MKC-KO 47nF 630/220V	Capacitor MKC-KO 47nF 630/220V
C039	45510	Kondensator MKC-KO 47nF 630/220V	Capacitor MKC-KO 47nF 630/220V
C040	41709	SMD Kondensator AL-ELKO 22uF 16V SUP16 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 16V SUP16 (MOQ:50x)
C041	41709	SMD Kondensator AL-ELKO 22uF 16V SUP16 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 16V SUP16 (MOQ:50x)
C042	41709	SMD Kondensator AL-ELKO 22uF 16V SUP16 (MOQ:50x)	SMD capacitor AL-ELKO 22uF 16V SUP16 (MOQ:50x)
C043	45342	SMD Kondensator AL-ELKO 4,7uF 25V SUP12 (MOQ:50x)	SMD capacitor AL-ELKO 4.7uF 25V SUP12 (MOQ:50x)
C044	19512	SMD Kondensator KERKO 1nF 50V NP0 0805 (MOQ:50x)	SMD capacitor KERKO 1nF 50V NP0 0805 (MOQ:50x)
C045	19479	SMD Kondensator KERKO 470pF 50V NPO 0805 (MOQ:50x)	SMD capacitor KERKO 470pF 50V NPO 0805(MOQ:50x)
C046	17630	SMD Kondensator KERKO 4,7nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 4.7nF 50V X7R 0805 (MOQ:50x)
C047	16632	Kondensator MKT-KO 1uF 50V	Capacitor MKT-KO 1uF 50V
C048	16632	Kondensator MKT-KO 1uF 50V	Capacitor MKT-KO 1uF 50V
C049	16632	Kondensator MKT-KO 1uF 50V	Capacitor MKT-KO 1uF 50V
C050	16632	Kondensator MKT-KO 1uF 50V	Capacitor MKT-KO 1uF 50V
C051	16632	Kondensator MKT-KO 1uF 50V	Capacitor MKT-KO 1uF 50V
C052	16632	Kondensator MKT-KO 1uF 50V	Capacitor MKT-KO 1uF 50V
C057	17648	SMD Kondensator KERKO 10nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 10nF 50V X7R 0805 (MOQ:50x)
C058	17648	SMD Kondensator KERKO 10nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 10nF 50V X7R 0805 (MOQ:50x)
C059	19483	SMD Kondensator KERKO 680pF 50V NP0 (MOQ:50x)	SMD capacitor KERKO 680pF 50V NP0 (MOQ:50x)
C060	19483	SMD Kondensator KERKO 680pF 50V NP0 (MOQ:50x)	SMD capacitor KERKO 680pF 50V NP0 (MOQ:50x)
C061	29112	SMD Kondensator KERKO 220pF 50V NP0 0805 (MOQ:50x)	SMD capacitor KERKO 220pF 50V NP0 0805 (MOQ:50x)
C062	29112	SMD Kondensator KERKO 220pF 50V NP0 0805 (MOQ:50x)	SMD capacitor KERKO 220pF 50V NP0 0805 (MOQ:50x)
C063	29112	SMD Kondensator KERKO 220pF 50V NP0 0805 (MOQ:50x)	SMD capacitor KERKO 220pF 50V NP0 0805 (MOQ:50x)
C064	29112	SMD Kondensator KERKO 220pF 50V NP0 0805 (MOQ:50x)	SMD capacitor KERKO 220pF 50V NP0 0805 (MOQ:50x)
C065	17654	SMD Kondensator KERKO 1nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 1nF 50V X7R (MOQ:50x)
C066	17654	SMD Kondensator KERKO 1nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 1nF 50V X7R (MOQ:50x)
C067	17654	SMD Kondensator KERKO 1nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 1nF 50V X7R (MOQ:50x)
C068	17654	SMD Kondensator KERKO 1nF 50V X7R (MOQ:50x)	SMD capacitor KERKO 1nF 50V X7R (MOQ:50x)
D001	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D002	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D003	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D004	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D005	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D006	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D008	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D009	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D010	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D011	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D012	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D013	45514	Diode BYD37M SOD87 SUP8	Diode BYD37M SOD87 SUP8
D014	45514	Diode BYD37M SOD87 SUP8	Diode BYD37M SOD87 SUP8
D015	45514	Diode BYD37M SOD87 SUP8	Diode BYD37M SOD87 SUP8
D016	45514	Diode BYD37M SOD87 SUP8	Diode BYD37M SOD87 SUP8
D017	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2
D018	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2

POS	IDENT	BEZEICHNUNG	DESCRIPTION
D019	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2
D020	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2
D021	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2
D022	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2
D023	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2
D024	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2
D025	40390	SMD Z-Diode Mini-MELF ZMM10-2	SMD z diode Mini- MELF ZMM10-2
D026	32945	Mini-MELF-Z-Diode ZMM5,1-2	Mini-MELF-Z-Diode ZMM5.1-2
D027	32945	Mini-MELF-Z-Diode ZMM5,1-2	Mini-MELF-Z-Diode ZMM5.1-2
D028	32945	Mini-MELF-Z-Diode ZMM5,1-2	Mini-MELF-Z-Diode ZMM5.1-2
D029	45516	Duo-LED, grün+rot	Double LED, green+red
D031	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D032	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D033	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
D034	29994	SMD Diode Mini-MELF LL4148	SMD diode Mini-MELF LL4148
F001	45525	Sicherung	Fuse
J001	45589	Buchse P-CIN4 2xrot+2xweiß	Socket P-CIN4 2xred+2xwhite
L002	45513	Spule 22uH	Coil 22uH
L006	37294	SMD Spule 2,2mH	SMD coil 2.2mH
Q001	32468	SMD Transistor BC860B SOT23	SMD transistor BC860B SOT23
Q002	32468	SMD Transistor BC860B SOT23	SMD transistor BC860B SOT23
Q003	32467	SMD Transistor BC850B SOT 23	SMD transistor BC850B SOT23
Q004	32467	SMD Transistor BC850B SOT 23	SMD transistor BC850B SOT23
Q005	32467	SMD Transistor BC850B SOT 23	SMD transistor BC850B SOT23
Q006	45511	SMD N-Mosfet BSP125 SOT223	SMD N Mosfet BSP125 SOT223
Q007	45511	SMD N-Mosfet BSP125 SOT223	SMD N Mosfet BSP125 SOT223
Q008	45511	SMD N-Mosfet BSP125 SOT223	SMD N Mosfet BSP125 SOT223
Q009	45511	SMD N-Mosfet BSP125 SOT223	SMD N Mosfet BSP125 SOT223
Q010	45511	SMD N-Mosfet BSP125 SOT223	SMD N Mosfet BSP125 SOT223
Q011	45511	SMD N-Mosfet BSP125 SOT223	SMD N Mosfet BSP125 SOT223
Q012	45511	SMD N-Mosfet BSP125 SOT223	SMD N Mosfet BSP125 SOT223
Q013	45511	SMD N-Mosfet BSP125 SOT223	SMD N Mosfet BSP125 SOT223
Q015	45512	N-Kanal Mosfet 2SK1301 TO220AB	N channel Mosfet 2SK1301 TO220AB
R001	34464	SMD Widerstand MELF 100k 1% 0204 (MOQ:50x)	SMD resistor MELF 100k 1% 0204 (MOQ:50x)
R002	34464	SMD Widerstand MELF 100k 1% 0204 (MOQ:50x)	SMD resistor MELF 100k 1% 0204 (MOQ:50x)
R003	33232	SMD Widerstand MELF 3k32 1% 0204 (MOQ:50x)	SMD resistor MELF 3k32 1% 0204 (MOQ:50x)
R004	33232	SMD Widerstand MELF 3k32 1% 0204 (MOQ:50x)	SMD resistor MELF 3k32 1% 0204 (MOQ:50x)
R005	33232	SMD Widerstand MELF 3k32 1% 0204 (MOQ:50x)	SMD resistor MELF 3k32 1% 0204 (MOQ:50x)
R006	33232	SMD Widerstand MELF 3k32 1% 0204 (MOQ:50x)	SMD resistor MELF 3k32 1% 0204 (MOQ:50x)
R007	37201	SMD Widerstand MELF 221k 1% 0204 (MOQ:50x)	SMD resistor MELF 221k 1% 0204 (MOQ:50x)
R008	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R009	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R010	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R011	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R012	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R013	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R014	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R015	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R016	40347	SMD Widerstand MELF 47k5 1% 0204 (MOQ:50x)	SMD resistor MELF 47k5 1% 0204 (MOQ:50x)
R017	34463	SMD Widerstand MELF 10k 1% 0204 (MOQ:50x)	SMD resistor MELF 10k 1% 0204 (MOQ:50x)
R019	34463	SMD Widerstand MELF 10k 1% 0204 (MOQ:50x)	SMD resistor MELF 10k 1% 0204 (MOQ:50x)
R020	34463	SMD Widerstand MELF 10k 1% 0204 (MOQ:50x)	SMD resistor MELF 10k 1% 0204 (MOQ:50x)
R021	34463	SMD Widerstand MELF 10k 1% 0204 (MOQ:50x)	SMD resistor MELF 10k 1% 0204 (MOQ:50x)
R022	34463	SMD Widerstand MELF 10k 1% 0204 (MOQ:50x)	SMD resistor MELF 10k 1% 0204 (MOQ:50x)
R024	34463	SMD Widerstand MELF 10k 1% 0204 (MOQ:50x)	SMD resistor MELF 10k 1% 0204 (MOQ:50x)
R025	34463	SMD Widerstand MELF 10k 1% 0204 (MOQ:50x)	SMD resistor MELF 10k 1% 0204 (MOQ:50x)
R026	40087	MELF Widerstand 10M 2% 0204 (MOQ:50x)	MELF resistor 10M 2% 0204 (MOQ:50x)
R027	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R028	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R029	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R030	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R031	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R032	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R033	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R034	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R035	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R036	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R037	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R038	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R039	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R040	34461	SMD Widerstand 1k 1% 0204 (MOQ:50x)	SMD resistor 1k 1% 0204 (MOQ:50x)
R041	34462	SMD Widerstand 681k 1% 0204 (MOQ:50x)	SMD resistor 681k 1% 0204 (MOQ:50x)
R042	40477	SMD Widerstand MELF 1k21 1% 0204 (MOQ:50x)	SMD resistor MELF 1k21 1% 0204 (MOQ:50x)

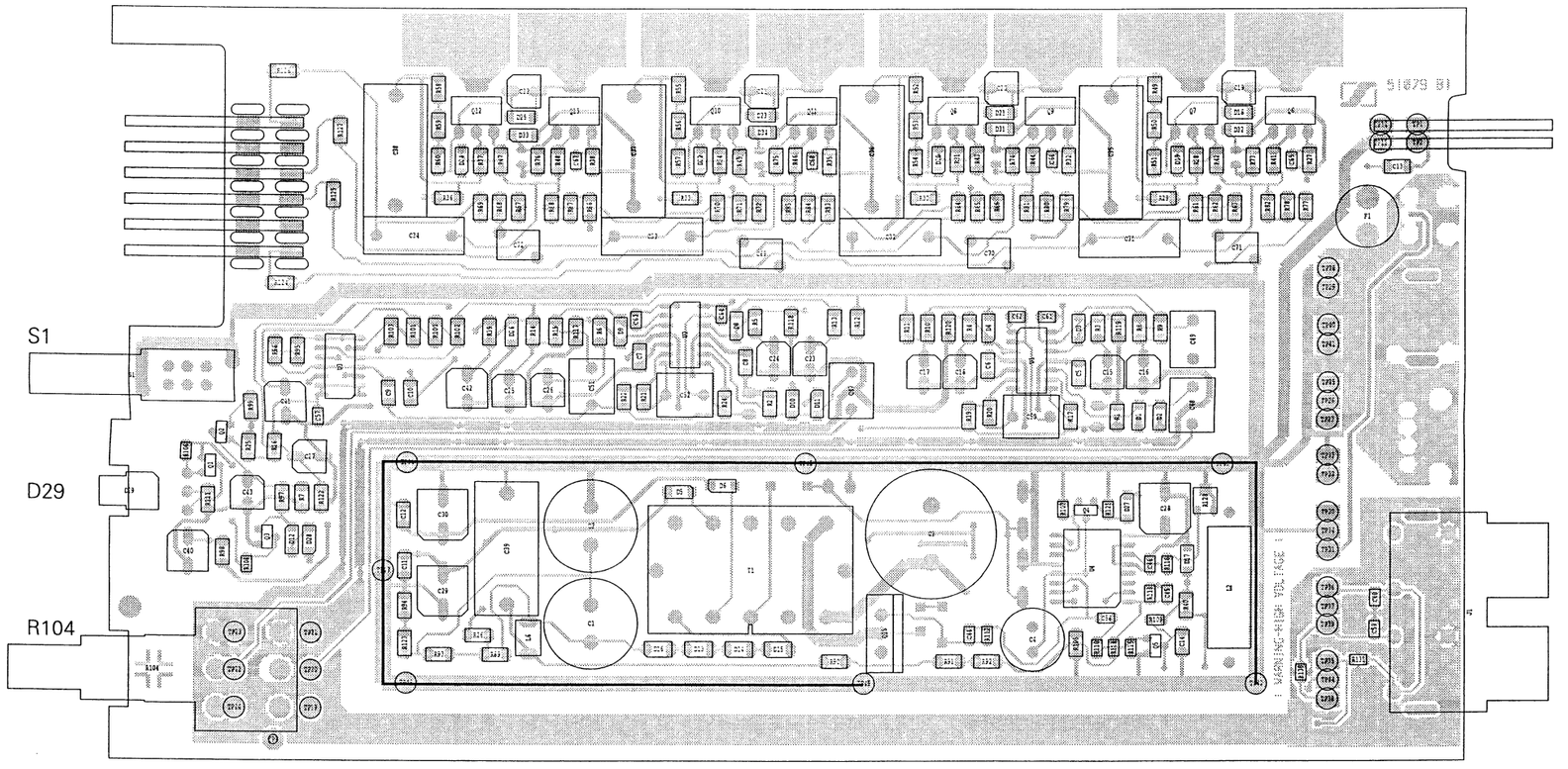
POS	IDENT	BEZEICHNUNG	DESCRIPTION
R043	40477	SMD Widerstand MELF 1k21 1% 0204 (MOQ:50x)	SMD resistor MELF 1k21 1% 0204 (MOQ:50x)
R044	34462	SMD Widerstand 681k 1% 0204 (MOQ:50x)	SMD resistor 681k 1% 0204 (MOQ:50x)
R045	40477	SMD Widerstand MELF 1k21 1% 0204 (MOQ:50x)	SMD resistor MELF 1k21 1% 0204 (MOQ:50x)
R046	34462	SMD Widerstand 681k 1% 0204 (MOQ:50x)	SMD resistor 681k 1% 0204 (MOQ:50x)
R047	40477	SMD Widerstand MELF 1k21 1% 0204 (MOQ:50x)	SMD resistor MELF 1k21 1% 0204 (MOQ:50x)
R048	34462	SMD Widerstand 681k 1% 0204 (MOQ:50x)	SMD resistor 681k 1% 0204 (MOQ:50x)
R049	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R050	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R051	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R052	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R053	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R054	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R055	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R056	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R057	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R058	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R059	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R060	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R061	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R062	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R063	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R064	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R065	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R066	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R067	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R068	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R069	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R070	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R071	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R072	40802	MELF Widerstand 1m50 1% 0204 (MOQ:50x)	MELF resistor 1m50 1% 0204 (MOQ:50x)
R073	40343	SMD Widerstand MELF 2k21 1% 0204 (MOQ:50x)	SMD resistor MELF 2k21 1% 0204 (MOQ:50x)
R074	40343	SMD Widerstand MELF 2k21 1% 0204 (MOQ:50x)	SMD resistor MELF 2k21 1% 0204 (MOQ:50x)
R075	40343	SMD Widerstand MELF 2k21 1% 0204 (MOQ:50x)	SMD resistor MELF 2k21 1% 0204 (MOQ:50x)
R076	40343	SMD Widerstand MELF 2k21 1% 0204 (MOQ:50x)	SMD resistor MELF 2k21 1% 0204 (MOQ:50x)
R077	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R078	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R079	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R080	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R081	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R082	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R083	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R084	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R085	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R086	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R087	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R088	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R089	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R090	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R091	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R092	45273	SMD Widerstand MELF 825k 1% 0204 (MOQ:50x)	SMD resistor MELF 825k 1% 0204 (MOQ:50x)
R093	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R094	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R095	34513	SMD Widerstand 221k 1% 0204 (MOQ:50x)	SMD resistor 221k 1% 0204 (MOQ:50x)
R096	34513	SMD Widerstand 221k 1% 0204 (MOQ:50x)	SMD resistor 221k 1% 0204 (MOQ:50x)
R097	34513	SMD Widerstand 221k 1% 0204 (MOQ:50x)	SMD resistor 221k 1% 0204 (MOQ:50x)
R098	37198	SMD Widerstand 100R 1% 0204 (MOQ:50x)	SMD resistor 100R 1% 0204 (MOQ:50x)
R099	40384	SMD Widerstand MELF 22R1 1% 0204 (MOQ:50x)	SMD resistor MELF 22R1 1% 0204 (MOQ:50x)
R100	40387	MELF Widerstand 8k25 1% 0603 (MOQ:50x)	MELF resistor 8k25 1% 0603 (MOQ:50x)
R101	40387	MELF Widerstand 8k25 1% 0603 (MOQ:50x)	MELF resistor 8k25 1% 0603 (MOQ:50x)
R102	40479	MELF Widerstand 68k1 1% 0204 (MOQ:50x)	MELF resistor 68k1 1% 0204 (MOQ:50x)
R103	40479	MELF Widerstand 68k1 1% 0204 (MOQ:50x)	MELF resistor 68k1 1% 0204 (MOQ:50x)
R105	40389	MELF Widerstand 27k4 1% 0204 (MOQ:50x)	MELF resistor 27k4 1% 0204 (MOQ:50x)
R106	29103	SMD Widerstand 10k 5% 0805 (MOQ:50x)	SMD resistor 10k 5% 0805 (MOQ:50x)
R107	29103	SMD Widerstand 10k 5% 0805 (MOQ:50x)	SMD resistor 10k 5% 0805 (MOQ:50x)
R108	29170	SMD Widerstand 100k 5% 0805 (MOQ:50x)	SMD resistor 100k 5% 0805 (MOQ:50x)
R109	29170	SMD Widerstand 100k 5% 0805 (MOQ:50x)	SMD resistor 100k 5% 0805 (MOQ:50x)
R110	29170	SMD Widerstand 100k 5% 0805 (MOQ:50x)	SMD resistor 100k 5% 0805 (MOQ:50x)
R111	34512	SMD Widerstand 4k75 1% 0204 (MOQ:50x)	SMD resistor 4k75 1% 0204 (MOQ:50x)
R112	29561	SMD Widerstand 22R 5% 0805 (MOQ:50x)	SMD resistor 22R 5% 0805 (MOQ:50x)
R113	32822	SMD Widerstand 470k 5% 0805 (MOQ:50x)	SMD resistor 470k 5% 0805 (MOQ:50x)
R114	29107	SMD Widerstand 47k 5% 0805 (MOQ:50x)	SMD resistor 47k 5% 0805 (MOQ:50x)
R115	29107	SMD Widerstand 47k 5% 0805 (MOQ:50x)	SMD resistor 47k 5% 0805 (MOQ:50x)
R116	29119	SMD Widerstand 27k 5% 0805 (MOQ:50x)	SMD resistor 27k 5% 0805 (MOQ:50x)

POS	IDENT	BEZEICHNUNG	DESCRIPTION
R117	45524	SMD Widerstand MELF 51k1 1% 0204 (MOQ:50x)	SMD resistor MELF 51k1 1% 0204 (MOQ:50x)
R118	45524	SMD Widerstand MELF 51k1 1% 0204 (MOQ:50x)	SMD resistor MELF 51k1 1% 0204 (MOQ:50x)
R119	45524	SMD Widerstand MELF 51k1 1% 0204 (MOQ:50x)	SMD resistor MELF 51k1 1% 0204 (MOQ:50x)
R120	45524	SMD Widerstand MELF 51k1 1% 0204 (MOQ:50x)	SMD resistor MELF 51k1 1% 0204 (MOQ:50x)
R121	29985	SMD Widerstand 1M 5% 0805 (MOQ:50x)	SMD resistor 1M 5% 0805 (MOQ:50x)
R122	34514	SMD Widerstand MELF 475k 1% 0204 (MOQ:50x)	SMD resistor MELF 475k 1% 0204 (MOQ:50x)
R123	34474	SMD Widerstand 1M 1% 0204 (MOQ:50x)	SMD resistor 1M 1% 0204 (MOQ:50x)
R124	32258	SMD Widerstand MELF 15k 1% 0204 (MOQ:50x)	SMD resistor MELF 15k 1% 0204 (MOQ:50x)
R125	32258	SMD Widerstand MELF 15k 1% 0204 (MOQ:50x)	SMD resistor MELF 15k 1% 0204 (MOQ:50x)
R126	32258	SMD Widerstand MELF 15k 1% 0204 (MOQ:50x)	SMD resistor MELF 15k 1% 0204 (MOQ:50x)
R127	32258	SMD Widerstand MELF 15k 1% 0204 (MOQ:50x)	SMD resistor MELF 15k 1% 0204 (MOQ:50x)
R128	45430	SMD Trimmwiderstand 1k	SMD resistor, variable 1k
R130	33113	SMD Widerstand 0R 0805 (MOQ:50x)	SMD resistor 0R 0805 (MOQ:50x)
R131	33113	SMD Widerstand 0R 0805 (MOQ:50x)	SMD resistor 0R 0805 (MOQ:50x)
S001	45520	Druckschalter 2xUM/U	Press switch 2xUM/U
T001	45517	Transformator EF25	Transformer EF25
U001	41402	SMD IC TL074ID	SMD IC TL074ID
U002	41402	SMD IC TL074ID	SMD IC TL074ID
U003	32249	IC 339	IC 339
U004	45526	SMD IC SO16L SUP12	SMD IC SO16L SUP12
ZZ010	51809	Faltschachtel	Folding box
ZZ011	51811	Einsatz	Insert
ZZ012	51856	Einsatz (Netzteil)	Insert (power suply unit)
ZZ013	51858	Einsatz (Kabel)	Insert (cable)
ZZ020	51815	Bedienungsanleitung HEV70	Instructions for use HEV70

Ident.-Nr. 52166
Printed in Germany



HEV 70, STROMLAUFPLAN
HEV 70, CIRCUIT DIAGRAM



HEV 70, GEDRUCKTE SCHALTUNG, BESTÜCKUNGSSEITE
HEV 70, PRINTED CIRCUIT BOARD, COMPONENT SIDE